Space Weather Forecast

Issued on Friday, 19 May 2023 at 01:25 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Minor/Moderate radio blackouts from Moderate-class X-ray flares likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the past 24 hours, with occasional Moderate class flares, these originating from AR3311. The most significant flare was a long duration Moderate class flare from AR3311 peaking at 18/2023 UTC.

AR3311 is one of eight numbered sunspot regions on the visible disc. It appears to be the most magnetically complex. However, AR3310 is the largest region on the disc and may also be magnetically complex, but is still close to the eastern limb and therefore hard to analyse. AR3305 is a small region in the western hemisphere, with potential to become magnetically complex as well, as there has been some growth of the region over the past 24 hours. The remaining spots are relatively stable, small and weak.

There are currently many filaments on the disc. There have been various filament eruptions over the past 24 hours, and also prominence eruptions, these mainly from the NE limb or quadrant or far sided. At present none of the associated Coronal Mass Ejections (CME's) are expected to be Earth directed, although confirmation is awaited following the results of modelling.
However, an earlier filament eruption from the southwest quadrant, around 17/1800 UTC, appears to have an Earth directed component.

Solar Wind / Geomagnetic Activity: The solar wind speed has continued at background levels, generally around 350 km/s. The IMF was weak, while the north-south component was also weak and often positive.
The net result of the above solar wind measures was for quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: Solar radiation showed a continued slow decline in the wake of 16 May's large proton-producing Moderate class flare from behind the eastern solar horizon, having peaked at 0.8pfu - i.e. roughly ten times below S1 for this energy level.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to be Moderate, with a slight chance of Strong-class X-ray flares, arising mainly from the arriving combination of eastern solar horizon spots. No significant regions leave the Sun in the period, and no new large regions are expected to arrive, leading to a level risk throughout.

Solar Wind / Geomagnetic Activity: A filament eruption on the 17th from the southwest quadrant resulted in a CME, which has now been analysed with a potential Earth directed component arriving on the 21st. However, this CME is likely to be weak, and a significant impact

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is unlikely.

An enhanced solar wind from a coronal hole feature is expected to arrive tomorrow at Earth, most likely in the evening, with speeds of 450-500 km/s expected. The effects of this enhancement are likely to wane through day 4 (22nd).
Therefore Quiet geomagnetic activity is expected until tomorrow, increasing to become Quiet to Unsettled later tomorrow, with Active intervals likely tomorrow and also with the excepted CME arrival on day 3 (21st) and then residual CME effects lasting into early day 4 (22nd). By late day 4 generally Quiet conditions are expected to return.

Energetic Particles / Solar Radiation: Solar radiation carries a daily Slight Chance of passing S1 levels, largely as a result of the eastern hemisphere spots, with this very gradually rising over the four days as they migrate westwards.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	10	30	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	No	15	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	15	15
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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